MTM

The Journal of Methods-Time Measurement

MTM ASSOCIATION FOR STANDARDS AND RESEARCH

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In This Issue . . .

Management and the Industrial Engineer

MTM and Time Study Team in the Office

An Application of MTM in Textiles

Industrial Engineering Seminars

The Journal of Methods-Time Measurement is dedicated to the technical aspects, application developments and general news items concerning the advancement of MTM.

The Journal encompasses the fields of endeavor that were formerly publicized in the MTM Newsletter and MTM Bulletin.

The technical section of the Journal is concerned chiefly with recent research developments both from the established research program at the University of Michigan, Ann Arbor, Michigan, and from somewhat smaller allied projects being conducted throughout the Association membership.

New applications of MTM as well as refinements of established applications are presented in the Application Section to illustrate specific approaches to management problems that can be solved through the use of Methods-Time Measurement.

Current events in the lives of persons associated with MTM are described in the general news section.

The Editorial Staff welcomes contributions for all three sections described.

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ODE TO AN M.T.M. STUDENT !!!!!!!!

We turn, we grasp, and regrasp a few,
Reach and we move, with a leg motion too,
And memorize tables as quick as can be,
Put pegs in their holes with a P2SE.

Then at our desk, with a grasp that's Case 1
Pick up our pencil, a breakdown's begun,
With a D-disengage, a turn with AP,
What the heck will the final analysis be?

Count TMUS, and bet your last dime
You missed out the sum of the Eye Travel Time.
But when it's all done, you look up and smile,
There's that little blue card that has made it worthwhile.

— C. A. Leak
Canadian Westinghouse

F E A T U R E

MANAGEMENT AND THE INDUSTRIAL ENGINEER

Mr. Brooks McCormick
Director of Manufacturing
International Harvester Co.
Chicago, Illinois
before
Second Annual Industrial Engineering Conference
A.I.I.E., Fort Wayne, Indiana
April 26, 1956

I think it is important in addressing a group of engineers that we have an early meeting of the minds on just what--or whom--we are talking about when we refer to the "industrial engineer." So I think an integral part of my introductory remarks ought to be some brief description of the industrial engineer. I suspect it is more of a "generic" term having a broad, inclusive meaning, rather than a particular title or description within the profession. You all know that engineering has been referred to as an offspring of science; in fact, an applied science which is concerned with human needs. Engineers, either because of their personal inclinations or other circumstances farther beyond their control, may find themselves in one of many major branches of the profession; for example: sales, research, design, production and industrial. But even to say that a man is an industrial engineer is like saying that a man is a musician. A musician may be a singer, a pianist or, I suppose, even a zither player. Similarly, an industrial engineer may have responsibilities in several fields.

This delineation of the title and the job description piqued my curiosity to the point where recently I looked into a catalogue of one of our major midwest engineering colleges. I wanted to see just how broad a field the industrial engineering course covered. The courses of study showed that the potential industrial engineer is concerned with these subjects: elements of motion and time study; quality control practice, plant maintenance engineering, materials handling, industrial packaging methods; production control; motion economy; advanced motion and time study; factory planning; quality control application; tool engineering economics; job evaluation and wage incentives; production management policy, and, analysis and research.

All of these were, of course, over and beyond the usual undergraduate prerequisite courses such as mathematics, the natural sciences and--that old "stand-by"--cost accounting.

I have taken the time to run through that list with you because I think it points up an important lesson: the responsibilities of, and the expectations from, the industrial engineer are practically unlimited. There is implied in such a course of study a much broader responsibility on the part of industrial engineers than perhaps many managements realize. We are getting away from the idea that they are specialists in the narrow sense of the word. At least we are, in theory, if not in practice.

This university catalogue of study I mentioned would support the old professor's ideas as to the need for sound theory first, I think, because it has this very significant bit of prose as applied to industrial engineering:

> "Upon an engineering background are built a series of Industrial Engineering courses that supply basic training in the major divisions of production management and also a sequence of courses in business and economics designed to familiarize the student with the economic, financial and other business aspects of production management. In the Industrial Engineering program as a whole, the course offerings and the requirements of the Department of Industrial Engineering and the Department of Business and Economics are carefully coordinated to insure a course of study in production management that is well-rounded and that encompasses the entire field of Industrial Engineering."

So it seems to me that the educators have some sound theories as to what the business world will

be expecting from the industrial engineer. They are trying to educate him for positions of heavier responsibility not merely in the narrow, technical fields of engineering but in broader concepts of the management profession.

* * * * * * * * * *

I have some notions, however, --and perhaps I might even say some reservations--as to whether management actually is getting a performance from the industrial engineer which is as large in scope as that for which the educators are trying to fit him. What does management expect from the engineer? The answer to this question depends, of course, in a large measure on management itself, and the answer will vary from industry to industry, as well as from firm to firm. Because management is people, management therefore varies from actual mismanagement to enlightened, progressive management.

Technological progress, particularly since the end of World War II, in all industry has brought many engineers into management. When you in your profession study this question, it no longer becomes an "academic" interest. It is, in fact, a matter of self-searching analysis and evaluation.

I have seen instances where the engineer discusses in a detached manner the policies and decisions of management as if he were standing in the wings watching the show. His observations are sometimes very critical, if apparently detached. So long as the engineer has this attitude, so long as he believes he is not part of the "management show," the engineer cannot really feel that he is part of the management team. Management cannot expect a maximum contribution from him. This attitude on the part of the engineer is the result of either management's failure to clearly spell out the objectives, policies and plans of management to the engineer, or the engineer's inability or unwillingness to accept his responsibility as a member of the management organization.

* * * * * * * * * *

Ideally, what should management expect of the industrial engineer? Certainly it has the right to expect the industrial engineer to provide ideas as to job simplification, improved plant layouts, equipment improvement and replacement, materials handling, establishing and administering wage and incentive payment systems, production control and quality control. Once having these ideas approved, he ought to be equipped to execute them in a workable program of administration.

But in addition to these specific requirements, I think management has a right to expect each engineer to do his part in the training of personnel in order to supplement the company's long-range program for selection and development of engineering personnel. More important, I believe the enlightened management has the right to expect the engineer--in any field in the profession --to take the necessary initiative so as to acquire knowledge in the fields of finance, manufacturing, sales and distribution, and industrial relations, especially as they influence the engineer's situation as a member of the management team.

So I have no doubts about the great contributions that the industrial engineer can make to management. All of us have seen the achievements of the engineer and his application of science to the material welfare of mankind. The average layman is quite conscious that the engineer's universally accepted technology is the constructive basis for modern industry, high living standards, and even our national security.

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Too little has been said, though, of the great contribution which the engineer has made to modern management. Engineers have extended their attainments and mastery to all phases of management, often at the highest executive levels. It has been estimated that over a third of the management of large industry in America is in the hands of engineers. Almost a half of the mature engineering graduates now find their duties largely of a managerial nature. The crying need in all segments of American industry for more qualified engineers, both now and in the future years, will increase these percentages. Indeed, it seems clear that management has recently become a profession into which the engineer has preferred entree.

I am sure I need not buttress these observations with any detailed statistics, because they are commonly accepted, but I would refer you to such studies as The Engineers' Joint Council Report, University of Missouri's Professor Harry Rubey's paper before the Centennial of Engineering in 1952, and TIME magazine's Research Report No. 1069. All of these show conclusively that the engineer is making an outstanding contribution to management. Rensselaer Polytechnic Institute as long ago as 1949, questioned 591 executives of large companies and found that almost 40 percent of the executive and managerial positions in the industries were then held by graduates of colleges of engineering. It is reasonable to assume that this figure is substantially higher today. In 1951 the American Society for

Engineering Education, as a result of a study it made, reported, "A careful study of the number of engineering graduates who hold executive positions in industry has shown that engineers have from 10 to 20 times the probability of attaining executive positions as compared with all other college graduates."

But if America is the "land of milk and honey" for ambitious and enterprising engineers, it is also true that this poses some special problems for management as well as for the engineers. Both must work together in the training of engineers for higher management positions.

To begin with, there is a need for greater understanding of engineering on the part of policy-making-level executives. There is a need for closer liaison between executive management and research. In my own Company--and I am sure it is equally true of yours--I see valuable contributions to be made by engineers to other management groups. Our Law and Patent departments need the advice of an engineer on patents or in negotiations; our industrial relations and accounting people need counsel on costs and time study; advertising and purchasing people need to talk with engineers, to learn their point of view as well as their language. Industrial engineers with sound work measurement and production standards experience are of immeasurable assistance to the labor relations staff people.

Engineers have a natural advantage in assisting other operating and staff departments in working toward higher management positions. Engineering training provides them with a background of fundamentals which makes it easier to master quickly the principles of machinery, the details of manufacturing processes and the product. They also learn to gather facts, arrange and analyze them logically, and to base their decisions and judgments on their conclusions.

* * * * * * * * * *

Yet despite these advantages--or, perhaps, because of them--many engineers find it difficult to step into policy-making executive jobs. My personal opinion is that one reason for this stems from the fact that engineers find it difficult to measure the "intangibles" in business, and therefore underestimate their importance. I realize that here I am perhaps walking where angels fear to tread, but I think we all ought to recognize that engineers sometimes fail to realize the importance of those things which cannot be measured --and industry is replete with problems arising out of "intangibles"--attitudes, emotions, preconceived ideas, management traditions. As a result, they find it hard to deal with those problems which cannot be solved by logic alone.

I believe most corporation executives would tell you that very often problems arise either in human relationships or in probing into unknown physical--or material--problems when an imaginative approach becomes more valuable than a "judicial" or "analytical" one. Guesses and formulas, calculated risks, based on intuition and judgment, sometimes must be taken when no charts, slide rules or formulas will help or when the lack of time will not permit any extensive analysis.

Addressing himself to this very problem, an executive of the American Brake Shoe Company, quoted in the Harvard Business Review last year, put it well, I think, when he said:

> "There seems to be too little in the training of an engineer to make him realize that the world is full of people. Perhaps you would call this the aptitude for humanity. Pure technicians--the laboratory analyst, the aircraft stress engineer, the highly specialized surgeon--can forget the importance of this. But none of them can become a successful manager until he learns that people make up as much of the world as the elements. Certainly management in business must understand this. Human nature is fascinating, but it can be extremely tantalizing because it follows no known scientific law nor even a broad principle."

So there is clearly a need for good engineers to become good managers. This is not confined to the needs of individual companies, either. It has a social significance affecting our entire American economy. President Griswald of Yale University pointed out:

> "It is said that the demand for engineers is so urgent that it would be impractical to prolong their apprenticeship with the liberal arts. Yet the most urgent part of this urgent demand is for engineers who can cope with human problems. Only these can save our technology from becoming a headless, heartless and eventually helpless monster."

* * * * * * * * * *

What I have been saying thus far might be summarized this way: Engineers, as a group, are accustomed to being guided in their decisions by facts, and rules based on facts. They are predisposed by training to reach out for experimental evidence which is reproducible. They

have a healthy and inherent respect for the "absolute truth," as contrasted with opinion, "hunch," or even imaginative thinking. They often rely too much on factual knowlege, without assessing the importance of the intangible.

So, first, we have engineers in management in growing numbers. Secondly, we must continue to have them there--in much larger numbers--if we are to maintain and increase our rate of industrial and economic progress. Thirdly, engineers are, by reason of their training and background, especially qualified to be managers. Fourth, in order to realize their full potential on the management team, engineers and their superiors ought to be looking to the job of inner development by increasing their job responsibilities, by widening their concepts of management philosophies and practices.

Let's see if we can make an appraisal of the status of the engineer's job in management by probing into the ways in which engineers can help themselves and, secondly, the ways in which policy-making executives at the top can assist them in this "inner development."

This is a tall order in the limited amount of time allotted to me, but I have some notions on this question. You may not agree with all of them, but, on the theory that self-examination is good for the soul, it should not be time wasted.

I think self-improvement begins when we recognize our own limitations and strive to overcome them. I have already indicated what I believe are some of the engineer's occupational limitations--the natural tendency to shy away from the intangibles, the reluctance to cope with problems that cannot be measured with the slide rule. This is a reluctance born of engineering training, perhaps, and, therefore, understandable.

Many engineers in management spend too much time analyzing and exploring. They search too long for several proofs to bolster their decision. This is commendable, perhaps, in comparison with the salesman type who judges too quickly, or not at all, on a hunch and rushes into a decision without a full set of facts. But when an engineer must go through a laborious decision-making process of cause and effect, the decision sometimes comes too late--the problem by that time is incapable of cure. So I think that sometimes engineers are so enmeshed in the pros-and-cons of gathering irrefutable evidence, that their timing is bad. The ability to make prompt decisions, in contrast to "snap judgments," is more and more a prime requisite of any business manager. And I believe there is a compromise between the extremes I have cited here.

Another weakness or "difficulty" some engineers have is that they are "one-man operators." They build fences around themselves at the drawing board or in the research laboratory, with the result that other staff people who could make a real contribution to the problem do not have an opportunity to help. This is fatal in any operating job, in my opinion. "Picking the brains" of all the best minds available is still the quickest and most effective way to lick a problem, generally speaking. While the engineer is usually trained to go at a problem from many angles, too often this is done "on his own" without seeking the advice and counsel of other management men who could bring a fresh viewpoint--and perhaps a better and quicker solution--to the problem.

I have heard corporation officials say that engineers tend to get so involved in engineering that they "do not see the forest for the trees"--their vision becomes too limited and, thus, they even waste the other latent managerial talents they may have. This happens when they get wrapped up in technical details and neglect the other facets of the problem--particularly the human problems.

These are but a few of the common pitfalls which I believe retard the engineer in working towards larger, more responsible, executive positions in industry. I hope you will not view my comments as any indictment of the engineering profession, for surely they are minor in relation to the over-all skills and knowledge which engineers have contributed to the technological progress of our country.

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But if these problems I have cited are valid, management is even more to be criticized for its failure to help the engineer come to grips with them.

I realize there is some danger in generalizing on this problem, simply because the peculiar circumstances of management, organizations, structure, development and reward vary so much from one company to another.

I believe one of management's weaknesses is simply its failure to assign as much responsibility to the industrial engineer as he is suited for. The end result is that the engineer does not have enough to challenge him. I believe that management can make wider use of the engineer in the future in the whole problem of finding more and

better ways to reduce manufacturing costs, to find methods to help offset the upward wage movement. This is a "must" in view of the fact that production is so close to present demands and, in many cases, already exceeding them.

In my own Company, I foresee a much wider use of the industrial engineer in long-term planning. This is a necessary part of good business management. Certainly the industrial engineer will be a part of any committee in this work. In Harvester, we have called upon industrial engineers to give us not merely help but real leadership in our over-all long-range planning methods. In 1946 we established a Manufacturing Research Laboratory, which provides data and recommendations to the manufacturing engineering groups in our plants regarding trends and progress in manufacturing methods and techniques.

I am sure you are aware that one of the burning questions confronting business today is the matter of application of principles of work measurement to the indirect employes in both offices and shops. If we are to have conservation of needed manpower and essential cost reductions, management will depend on the industrial engineers to give direction and leadership.

The whole problem of "automation," to use a little-understood and often over-rated term, is one which the industrial engineers will be expected to help us solve, and I am pleased to note that Mr. Anderson of The Chrysler Corporation is going to discuss this "$64,000 Question" this afternoon.

So I don't think management has to worry about any "make-work" program for its industrial engineers. It will aid in their development if it gives them the responsibility--and commensurate authority--to solve some of these thorny management problems.

Another way in which I believe that management can aid in the higher development of engineers is to assign them responsibilities out of their specialized field, gradually, and with coaching and direction from senior officials. Industrial engineering is an ideal training ground for manufacturing supervisory and staff positions This means a wider exposure to the problems of management. It calls for management to make the opportunity for the engineer to know of--and to work at--jobs other than his engineering work.

Many good men, potential executives, have been hired into engineering jobs on a very impersonal basis (particularly in larger companies) by personnel departments to fill particular jobs at a drafting board or in a research laboratory. It is a tragic indictment of management that so many of these men have become "buried" because management failed to take the time and effort to know and evaluate these people, to develop them for larger, more responsible positions

Certainly in no manner of a boast--and other companies have been doing so for some time --I am glad to be able to report to you that my own Company is now embarking on a very extensive, long-range, organized program for the training and development of professional, technical, and skilled employes in our Company, to be carried on in every operating division. While some of the details are yet to be worked out, I can tell you that it is one of the most important undertakings in the field of personnel development my Company has ever launched. I would be disappointed if many industrial engineers did not eventually find themselves in higher management positions as a result of this development program.

But even this type of organized program has its limitations on management, because it is bound to be "mass-organized" and therefore stereotyped to a degree unless it combines, as we propose to do in our own plan, the personal guidance and direction which senior officials should give to the engineer if full development is to be realized. I think top management people often miss opportunities to help the engineer on the job, to give him personal counseling out in the field or in the laboratory. Either out of natural reticence or for other reasons, senior officials fail to give frank criticisms and constructive suggestions for improved performance to the engineer, to point out greater opportunities for accomplishment, or even to "prod" the engineer into doing a better job. These things, directed along personalized, individual-coaching lines, are a "must" if the engineer is to be made to feel any important sense of belonging, to acquire an attitude of real accomplishment.

These things I have suggested are "individual" or personal in nature. From a policy standpoint, there are certain fundamental things which any far-sighted management can--and must --do to bring about the development of the engineer for top management positions. I am referring here, for example, to such basic matters as a sound employment and promotion policy, close attention to salary review, giving adequate remuneration and other rewards, as well as to status and authority.

If a company has sound personnel policies on these matters and executes them fairly and equitably, it can confidently expect engineers to make the kind of a large contribution to the management which it has a right to hope for.

* * * * * * * * * *

Gentlemen, I have imposed on your time--and perhaps your good humor, too--to take a candid and, I hope, constructive appraisal of the role of the industrial engineer in management. I have tried to weigh what I believe are the strengths and weaknesses of both management and the engineer so that we may approach from a realistic view the role of the industrial engineer in management. The record shows that many industrial engineers have pointed the way to opportunities by applying their skills and talents in the more important field of industrial endeavor--the wider field of influencing and leading personnel to better results and higher goals. I have tried to give you some notions of mine on what should and can be done --both by companies and by engineers--if engineers are to be prepared to leave the drafting boards, the laboratory, the stop watch, etc., in order to assume heavier management responsibilities which, experience shows, are potentially within their grasp.

The engineer is in management today, certainly--in ever-increasing numbers. But each engineer must ask himself if he is measuring up to what is expected of him as a member of the management organization. Similarly, each top executive must ask himself if he is doing everything he can to strengthen his organization by fully utilizing the available engineering talent, by consciously broadening his engineers so as to make them capable of assuming real management responsibilities.

I said earlier that "management is people"; it is a dynamic force created by a group of human beings. Many of them are engineers, but all of them are united in a common effort to plan and direct the utilization of men, materials and machines toward a single, desired goal with the greatest possible efficiency. I confidently expect that the industrial engineering profession will continue to make an even greater contribution to that common effort.

If management and the industrial engineer, by their joint efforts, can solve the problems I have mentioned, we will be much closer to the realization of this important common goal.

APPLICATION

I

MTM AND TIME STUDY TEAM IN THE OFFICE

Mr. N. L. Scheuer
Eli Lilly and Company
Presented at:
The Second Annual Management Conference
A.I.I.E., Fort Wayne, Indiana
April 26, 1956

Before we talk in some detail about work measurement in offices, I would like to provide you with some background information. Our company might be called "medium sized." It's located in Indianapolis where about 5,800 of us manufacture drugs and medicine. Work measurement and incentives have been part of the company since about 1913 or 14 and we've had a fairly extensive office work measurement program since 1948. I plan to tell you about that program.

I do not, however, want to indicate that we feel we are experts in setting office standards or that we have discovered a magic formula for success in this kind of a venture. Quite to the contrary, this talk is intended merely to tell you what we did, why we did it and, to some extent, what happened. We hope this will at least add fuel to the discussion of how far work measurement can and should be extended in industry. We realize the interesting problem of measuring office work is being approached in many different ways by other companies and we read with interest the accounts of their successes and problems. There isn't much question anymore of the value of work measurement; it's more a question of how such measurement can be obtained and used to greatest advantage. One thing we learned at least is that regardless of the approach, it's not easy.

The primary objective of our incentives program has always been to pay more money for more work of acceptable quality. This has been true of our studies in production incentives, maintenance incentives and also office incentives. Accomplishment of this objective achieved many secondary, but by no means minor objectives. Most obvious is that if the aims of management and employees coincide for a good financial reason, we gain a competitive advantage. That's good for profits, and it's good for employees because it's a form of job insurance. If we make a better product at a lower cost, we'll be selling medicine when our competitors are arranging lay-off schedules. In addition, such an arrangement eases the burden on supervision; it helps us get and keep good people by permitting higher earnings, and it helps us absorb the peaks in volume that hit each company, we hope, often.

We wanted work measurement to supply incentives in offices. But even without incentives, the measurement would be valuable for itself because of the big assist it provides toward methods work, scheduling and costing. With clerical work the size we face today a company must constantly evaluate itself in the office areas.

The objective is apparently very worthy, but having a fine goal, doesn't necessarily permit installation of the program. There are some valid reasons why one doesn't find measurement programs just anywhere. To list a few --

1. Measurement may be unacceptable to the persons who are doing the work or to their supervision and management. All of us in industrial engineering are familiar with the byword "our area is different."

2. Measurement and obtaining a count of the work may be an uneconomical proposition because of the expense of administration.

3. The nature of the work - the volume fluctuations, the flexibility of manpower utilization - may present obstacles hindering extensive coverage. It's hard to measure the work of an operator who flits from one job to the next and is temporarily idle tomorrow because of low volume.

The initial survey of our offices with a view toward incentives brought all three of these into focus clearly back in 1948 when we were choosing a course of action. I'm telling you this so you can understand why our standards have taken their present form. When we get around to discussing the techniques of measurement, you will observe that necessity has again been the mother of invention. Certain situations existed which helped us, and certain concepts were developed for the purpose of permitting our program to continue in the face of these inherent difficulties.

For example, with respect to the acceptability of our efforts, we were blessed with the support of a management willing to experiment and an unusual lack of resistance on the part of operators and supervision. This had evolved, we are sure, from the fact that management policies and wage policies over many past years had given the people a sense of security and confidence. For example, we've always tried to avoid layoffs. Happily, we've never been obliged to have one even though our work is very seasonal and we undergo a continual, rapid change in products to be produced. It was possible, in this atmosphere, for the use of standards and the objectives of the program to be understood for what they were meant to be. A work measurement program started on such a foundation saves many gray hairs. Had we encountered a less desirable situation, our work would surely have been harder and taken longer. As it was, we moved with considerable caution explaining as we went what we had in mind, how we would approach problems and why we thought the work worth while. We have maintained contact before measurement, during measurement and since measurement in the form of meetings, booklets and personal discussions. We've tried to keep standards simple and up to date. Lastly, we've tried to set our measurement policies to coincide with the policies of the company which had created the feeling of trust we mentioned before.

Acceptability being the first hurdle, the second was the problem of how to economically obtain both measurement and count. We found an answer to this in group measurement, because, if an office were considered as a group, work completed could be expressed in terms of the major activities of the office. For instance, in the purchasing department, if one counted purchase orders, invoices and a few other major activities, he would have an excellent index to the total work in the area. This was true because every office encountered seemed to have a definite purpose--perhaps to create or process a form or in other cases to record or report activity. Most operations in the offices were interrelated and largely interdependent. In the shipping department some typing, some filing, some posting, etc., occurred for every shipping order. Other activities depended upon the volume of narcotic orders or chill-room orders or replacements requested. Subsequent studies have indicated that in all offices most activities could be related to from five to twenty major units of measurement. The over-all picture shaped up then and still does as follows. Each office was considered a working unit. A set of standards was established for each and each standard contained time to do all activities in the office which could be related to the unit being counted.

The procedure for establishing a standard went something like this with some of these steps being performed simultaneously:

1. Flow charts were made showing the relationship of activities.

2. Methods studies were made as indicated. This, by the way, was a very rewarding activity, but that's another story.

3. Time values were established for the various operations and suboperations. We'll talk more about this later.

4. The relationships of activities were explored so that the occurrence of posting, filing, calculation, etc., could be predicted based upon the few selected units of measurement.

5. Standards were established for each major unit of measurement so that each standard contained time for all suboperation clearly related to the unit being counted. For example, the standard per shipping order would contain some typing time, some filing time, some time to prepare a report and some time to make up a related form when required.

Applying these standards, we found we could account for from fifty to seventy percent of the productive effort in each office. I might point out that these were not established to be precise standards. The parts of each standard varied in precision depending upon the importance of the suboperation and the difficulty of securing measurement. You can think of each standard as a collection of substandards, each established to meet the dictates of economy and accuracy. We, of course, explained to the people an exact measurement of work was impossible. They had no trouble accepting the situation.

To cover the remaining work--that is, the work in each office not reflected in the basic standards--certain allowances were added. Examples would be--

1. A personal allowance of 10% was added to each basic standard.

2. A miscellaneous operations allowance of up to 10% was also added to each to cover phone time, talk to supervision, obtain supplies, etc. This, as we will show, was determined by measurement through all-day studies or by a type of sampling.

3. A daily constant allowance was established in terms of standard minutes to cover activities such as supervision, trips, daily reports, etc., which do not vary with volume.

4. Lastly, some areas required that we call a process allowance to cover experimenting, planning, one-time-only work, etc. This has been worked out by estimate.

You can see that this concept also proved a boon in overcoming those obstacles which usually limited the extension of measurement to more than a portion of each office. We could incorporate some fairly rough measurement with confidence that such rough measurements would be stabilized by the more predominant good measurement and that the law of averages would work for and against the group to smooth off many of the rough spots. This permitted measurement of many operations not lending themselves to individual standards. Also group measurement as described circumvents the problems stemming from the economic realities of trying to count the work on any one form and might shift from one activity to the next as peaks and valleys occurred in the work load. If the count is made of units completed by the office (instead of by the individual) there is really relatively little to count and it doesn't make any difference who does the work or when. By way of side effects, this may be seen to promote co-operation between individuals and to focus the attention of the group on the important mission it is to accomplish. Audit becomes easy, and efficiency takes on a realistic meaning. Efficiency won't look high unless lost time is really being eliminated.

I wish I had time to describe the organization of the backing data for each standard so you could see how flexible this arrangement can be. We have little difficulty in revising standards for suboperations and subsequently changing the overall standards to agree with method changes and changes in the frequency of occurrence of the various activities. How well do they reflect activity? We've been basing incentive pay for about 550 people in 20 offices on this arrangement for almost six years and haven't yet had a complaint that we couldn't work out. Our groups covered, by the way, range from as few as seven people to one with about fifty people. It needn't necessarily be so, but we have applied this measurement in each office to all but a few key members of departmental supervision who participate in another incentive based on company profits. We set standards with a view toward covering all work and then charge all hours worked in the area.

In the light of that background, we can now discuss the actual measurement of the work. Within a set of standards all degrees of precision may be found. With a view toward trying to set the standard as carefully as necessary, the engineer selects different techniques for different types of operations. He may use MTM, time study by elements, time study by operation, or past performance depending upon how important a part the time will play in determining efficiency. Probably the most common approach is time study with the job studied being broken into relatively long elements. The use of a longer element is convenient because the operators are prone to use slightly different methods and sequence on each cycle. In some cases MTM can be used and will provide its many advantages. For example, MTM standards for card handling and machine loading in our IBM section take the form of standard data. This permits easy revision when reports are added or removed from the group's assignment.

We've trained all our industrial engineers in time study and since 1948 in MTM. In setting production department standards, MTM is the method of choice. Time study assumes a supplementary role. However, in the office, it is just the reverse. Most measurement for the establishment of office standards is by time study for these reasons.

1. In many offices the repeated occurrence of "think" and "plan" elements makes MTM difficult because such elements often limit out manual motions.

2. In the offices at our company, routine repetitive elements are in a minority. To be sure where they occur, we establish standards with proportionate precision, but the fact is--they are rare.

3. By using time study, our engineers are able to make certain observations useful in broadening the coverage. For instance, during each time study a record is kept of those elements which made up the miscellaneous allowance. If, for example, the operator answers the phone while being studied, the time consumed is recorded. Such times are subsequently compared to total study time so that a miscellaneous allowance can be computed.

The closer an office resembled a production department with respect to type and frequency of elements, the more apt we would be to use MTM and detailed time study. With conditions as we found them, however, MTM could not usually be used to advantage for the purpose of setting standards. In spite of that, we do not regret providing MTM training to all our engineers because we feel it provides a certain rounding to the man being trained. Those of you who have had the training probably understand what I mean. It leaves one with an insight into methods, positioning, eye time, etc., which is hard to obtain by other means. Also, we find much office measurement which is not a part of setting standards, and on some of this it's helpful to be able to make MTM analyses. We've found limited uses for MTM in form design for such tasks as laying out the form, choosing between separate and snapout forms, etc. It has application in equipment selection and layout as it does in production areas.

No discussion of the teaming of MTM and time study at Lillys would be complete without at least mention of our office standard data. I can't briefly describe how this was established. It covers typing, comptometer and calculator work and is a combination of MTM time study and mental times. We use this data when estimating times for new or non-routine operations.

To sum up our situation, time study is the backbone of our measurement, but we are glad to have MTM as an added tool. We could, no doubt, get along without it, but we wouldn't want to.

You might also be interested in a few brief points about the success of the whole program. After seven years, our feelings are pretty much as follows:

1. We think work measurement in offices is an extremely worth-while venture. We feel there is profit to be obtained through the methods work and through use of the standards derived. In most areas, when the work was subjected to scrutiny, the departmental supervision was able to devise ways of simplifying, eliminating, and combining operations with profitable results. The presentation of performance figures to the groups involved has also contributed toward profits through more proper staffing. There is some debate about whether financial incentives are necessary or not to accomplish this, but the fact remains that work measurement, with or without incentives, provides a fund of data very helpful to the planner.

2. The data obtained, if prepared to be accessible, speeds and encourages procedure and methods work. We get calls constantly from persons in all parts of the company asking how long it takes to make a photostat, how much it costs to make a purchase, how many wholesaler orders there are in a year and hundreds of similar questions. We are asked, for example, to review each requisition submitted for added personnel. On these we sometimes are able to recommend alternatives or predict situations which make an addition to our payroll unnecessary.

3. We feel we've increased the use and understanding of industrial engineering principles by working with supervision to chart work, to measure it and to review situations.

4. We feel we've increased the stature of industrial engineering at the company. We know more people well, and they tend to call on us more and more often to discuss problems of almost every conceivable nature.

We know we still have some work to do. This isn't the kind of program one puts in and forgets. Standards must be reviewed regularly, revised as conditions change and contact must be maintained with all parts of the company. We have fairly rough measurement, and we don't want it to get any rougher than it is.

We aren't so naive as to think this activity will make or break the company. There are other programs to accomplish the same end results. But, on the other hand, the eight people who measure this work for 550 people, calculate efficiencies, and serve as an information service certainly have a right to feel considerable satisfaction in their work. They do too.

APPLICATION
II

AN APPLICATION OF MTM IN TEXTILES

The Barber-Colman Spooling Process

A large southern textile manufacturer decided to investigate the Barber-Colman Spooling operations in one of its mills. Study was concentrated on the spooler tenders whose spindle assignments and rates of pay were felt to be inconsistent in many cases. As the mill operates over 6 large spoolers on three shifts, there were approximately 45 operators involved. Several counts of both warp and filling yarns were being spooled which required the determination of a large number of assignments and incentive rates. The spooling process also constituted a production bottleneck as the number of machines and the spindle capacity was not originally designed to handle the changing demands in the form of short runs on a wide range of yarn numbers. Varying bobbin running times created a further problem when forced to assign different yarns to the same spooler. When this occurred, due to the pressure of required production, a situation of task under assignment resulted. This caused lost production, higher than normal costs as well as lowered operator efficiency.

Those acquainted with the Barber-Colman Model C Spooler know of the many variables which can affect the production, spindle assignment, and tender's pay at this process. It is not our intention to define the machine itself as it does not concern this application of MTM, but it should be noted in passing that the machine complications must be considered constantly when analyzing a B-C spooler tender's work assignment.

An impression of the range of operating data may be gained from the following chart:

Yarn Count	Spooler YPM	Yards/Bobbin	Unwinding Mins./Bobbin	Per Cent Reties
8s/1	916	2639	2.88	26
12s/1	949	4847	5.11	36
14s/1	927	6153	6.64	33
18s/1	931	6636	7.13	51
20s/1	935	4417	4.72	33
25s/1	1003	4593	4.58	35
30s/1	1030	5194	5.04	27
30s/2	1003	6555	6.54	14

Basic workload data had been derived some time in the past through speed rated time study. An overhauling of the time study data was in order due to several minor changes in methods, operating conditions, and technological changes.

Methods-Time Measurement studies were conducted of each work element involved in tending the spooler. The following list described the cycle of work elements:

Classification	Basis	MTM Unit Time
Thread up full bobbin	Bobbin	.04227
Thread up retie bobbin	Bobbin	.03093
Doff single full cheese	Cheese	.07410
Doff two full cheeses	Two Cheeses	.10674
Truck to trident rack from end of thread up cycle	Trip	.04680
Transfer tridents	Trident	.08626
Truck to sorting table from trident rack	Trip	.03660
Sort bobbins - Strips	5 Bobbins	.06288
Sort bobbins - Reties	5 Bobbins	.13446
Return to starting point	Trip	.15492

As the threading up and doffing operations comprise approximately 70% of the total time required on most of the assignments, these two operations are shown in detail on the attached Methods Analysis Charts. The remaining work elements were analyzed with the results as shown above.

The threading up operations, trucking and sorting tasks were analyzed for several different

yarn counts and size spoolers in order to obtain unit times compatible with the conditions involved.

Increased fatigue factors were also selected for application to those yarns requiring such an allowance.

After careful study of the MTM results and consideration of the variable machine and production factors a change in operator methods was considered. The methods change was based principally upon a revision in the cyclical occurrences of the threading up and doffing. Before any changes were made in the department, entirely new threading up, doffing and service unit times were developed through MTM. The proposed methods were then projected into spindle assignment and rate calculations which provided a factual means of evaluating the new method.

The favorable results of the evaluation indicated the need for operator training in the new method before installation.

Again the MTM analysis served as the basis of the project. The detailed methods analysis of a combination of the old and new methods provided the data needed to compile a comprehensive training manual.

Three pages of detailed instructions taken from the training manual covering the work elements of threading up full bobbins and two conditions of threading up retie bobbins are shown as examples. It is self-evident that the basic data contained on these pages were drawn directly from the detailed MTM analysis of each operation.

After sufficient operators were trained and given time to become reasonably skilled on the new method, new rates were established on several yarn counts and put into active assignment. Some kinks had to be worked out before the assignments and rates were entirely satisfactory.

A measurement of the results obtained are shown in the following comparison based on the new and old methods for a coarse yarn number.

	Old	New
Number of spindles assigned	135	135
Minutes per cycle of knotter	7.00	7.00
Winding YPM	910	910
Yards per bobbin	3780	3780
Yards per cheese	23000	23000
% Reties	28	28
Full cheeses doffed per 40 hours	4347	4863
Bobbins handled per 40 hours	26430	29567
Standard task	84.0	84.0
Standard machine efficiency	32.7	34.6
Standard pounds per operator per 40 hours	9578	10110

An analysis of this comparison indicates that the new method yields 5.5% more production per operator on the basis of an 84% task in each case, and machine efficiency is increased a like amount.

This application of MTM served as an excellent illustration of some of the important advantages of MTM.

1. METHODS IMPROVEMENT

MTM was most instrumental in enabling us to consider methods changes. Development of possible methods changes through ordinary means would at best be a "guesstimate" and time consuming.

2. DEVELOPING AND EVALUATING BETTER METHODS IN ADVANCE OF PRODUCTION

Before actually putting the new method into production, we were able to develop a new and improved method. But what is most important--we were able to factually evaluate the new method. By using MTM data, one can itemize the gains and losses in required working time and derive a result for comparison and evaluation which will be extremely accurate.

3. ESTABLISHING TIME STANDARDS

MTM makes it possible to establish accurate time standards to be used in determing equitable machine assignments and incentive rates of pay with a minimum use of stop watch time study.

4. OPERATIVE TRAINING

The development of a training course for operatives is greatly simplified through the use of the MTM data. Clear, detailed, and accurate instructions are nearly automatic when drawn from the detailed MTM analysis of each operation.

5. DEVELOPING METHODS CONSCIOUSNESS

All of the personnel connected with the project became more aware of the importance of methods in developing work assignments.

COURSE B-C Spooler Tender	Elements of Work Threading Up Bobbins		8

Thread Up Full Bobbin

Description: This operation refers to bobbins which have come from the spinning frame or twister, whether or not the bobbin contains a full package of yarn. (all bobbins except reties).

Elements	Key Points
1. Get bobbin from trough	a. L. H., butt end towards R. H.
2. Pull off yarn for threading up	a. Find end at butt of bobbin b. Pull off backwind c. Reach back to bobbin and regrasp end d. Pull out about 8 inches
2-a. Pull off tail	a. Only if long enough to interfere with unwinding b. Break cleanly at base of package
3. Thread end in clamp	a. L. H. move bobbin to pocket and drop as R. H. pulls end into clamp and breaks b. R. H. breaks or cuts end at clamp as L. H. reaches toward trough for next bobbin c. Be sure end is cut or breaks near clamp

	B. T. A.	JEG	1-56

COURSE B-C Spooler Tender	Elements of Work		
	Threading Up Bobbins		9

Thread Up Retie Bobbin - Condition 1

Description: This operation is for bobbins on which the end has broken but is easily visible and is long enough to be grasped by the hand as it pulls the bobbin from the skewer.

Elements	Key Points
1. Move bobbin from skewer to threading position	a. R. H. grasp bobbin and lift from skewer b. Regrasp bobbin so as to catch loose end as bobbin is moved to threading position. c. Drop bobbin at front of pocket (Reserve Pocket)
2. Thread end in clamp	a. Be sure there are no defects in yarn between clamp and bobbin b. Be sure end is cut or breaks near clamp

Special Instructions

When threading up a retie bobbin as described above, the tender should observe the next pocket. If the next pocket does not hold a retie to be threaded, the L. H. should be getting a full bobbin from the supply trough as the R. H. threads up the retie bobbin.

COURSE	Elements of Work		
B-C Spooler Tender	Threading Up Bobbins		10

Thread Up Retie Bobbin - Condition 2

Description: Condition 2 exists when the retie bobbin is still on the skewer with the tip of the broken end visible, but the end is too short to grasp as the hand slides along the bobbin. One hand must hold the bobbin while the other hand grasps the tip of the yarn.

Elements	Key Points
1. Move bobbin from skewer to threading position	a. L. H. grasp bobbin and lift from skewer b. R. H. reach and grasp tip of end as L. H. moves bobbin c. L. H. drop bobbin in threading position
2. Thread end in clamp	a. R. H. start moving end toward clamp as soon as L. H. drops bobbin b. Be sure there are no defects in yarn between clamp and bobbin c. Be sure end is cut or breaks near clamp

Special Instructions

When threading up a retie bobbin as described above, the tender should observe the next pocket. If the next pocket does not hold another retie bobbin to be threaded, the L. H. should be getting a full bobbin from the supply trough as the R. H. threads up the retie bobbin.

MTM ELEMENT ANALYSIS

File: Study # 1

Part Name: B-C Spooler — Part No.:
Oper. Name: Thread Up Full Bobbin — Oper. No.:
Operator: No.: Analyst: RBM — Date: December, 1955

DESCRIPTION - LEFT HAND	F	MOTION	TMU	MOTION	F	DESCRIPTION - RIGHT HAND
1. Thread Up Full Bobbin - No Tail Interference						
A. Secure Bobbin for Threading						
Reach to Bobbin in Trough		R4C	8.4			
Grasp Bobbin		G1A	2.0	R14B		Reach to Bobbin in L. H.
Lift Bobbin out of Trough		M11B	12.8	G2		Regroup Ends Around Fingers
Turn Bobbin to Expose End		T90S				
			23.2			
B. Thread End in Clamp						
Turn Bobbin to Expose End	2	T90S	3.6	R1D		Reach to End on Bobbin
and Assist in Unwinding			3.5	G1B		Grasp End
			7.2	M8Bm		Pull Off Back Wind
			4.3	mR8Bm		Reach Back to Bobbin
			-	RL1		Toss End Off
			7.2	mM8B		Pull Off Another Length
			-	G2		Regrasp End
Move Bobbin to Pocket		M38	9.3	M11Bm		End up to Thread Clamp Opening
			7.2	mM8B		End Across Top of Thread Clamp
Drop Bobbin in Pocket		RL1	-	G2		Regrasp End
Reach Toward Supply Trough		R6B	4.0	D1E		Break End Off At Thread Clamp
Or Pocket			46.3			
2. Thread Up Full Bobbin - Tail Interference						
A. Secure Bobbin for Threading						
			23.2			Same As # 1 (A)
B. Thread End in Clamp						
Turn Bobbin to Expose End	2	T90S	3.6	R1D		Reach to End on Bobbin
And Assist in Unwinding			3.5	G1B		Grasp End
			7.2	M8Bm		Pull Off Back Wind
			7.2	mR8B		Reach Back to Interfering Tail
			3.5	G1B		Grasp Tail at Butt of Bobbin
			7.5	D2E		Break Tail Off Cleanly at Butt
			6.4	R4B		Reach To Freed End
			2.0	G1A		Grasp Loose End
Move Bobbin to Pocket		M4B	9.3	M11Bm		Move End Up To Thread Clp. Opn.
			7.2	mM8B		Move End Across Top of Th. Clp.
Drop Bobbin Pocket		RL1	-	G2		Regrasp End
Reach Toward Supply Trough		R6B	4.0	D1E		Break End Off at Thread Clamp
Or Pocket			61.4			

MTM ELEMENT ANALYSIS

File Study # 1

Part Name B-C Spooler Part No.
Oper. Name Thread Up Retie Bobbins Oper. No.
Operator No. Analyst REM Date December, 1955

DESCRIPTION - LEFT HAND	F	MOTION	TMU	MOTION	F	DESCRIPTION - RIGHT HAND
3. Thread Up Retie Bobbins						
A. Retie End Visibly Free (Leading To			Snick	Plate,	Etc.)	
			12.9	R12B		Reach To Bobbin In Pocket
			-	G2		Regrasp Ends Around Fingers
NOTE: L.H. Secure Bobbin For			2.0	G1A		Grasp Bobbin Near Nose
Threading - Element #1A			4.0	D1E		Pull Bobbin Off Skewer
			12.2	M10B		To Start Position In Pocket
			-	G?		Grasp Free End
			2.0	RL1		Drop Bobbin
			9.3	M11Bm		End Up To Thread Clamp Opening
			7.2	mM8B		End Across Top of Thread Clamp
			-	G2		Pegrasp End
			4.0	D1E		Break End Off In Clamp
			53.6			
B. Short Retie End Visible						
Toward Bobbin In Pocket		R9B	7.2	mM8B		End Across Top Of Thread Clamp
			4.0	D1E		Break End Off In Clamp
Reach To Bobbin In Pocket		R3B	5.3			
Grasp Bobbin Near Center		G1A	2.0			
Pull Bobbin Off Skewer		D1E	4.0			
Move Above Start Position		M10B	12.9	R12B		Reach To End On Bobbin
				G2		Regrasp Ends Around Fingers
			1.0	G1A	1/2	Grasp End When Free
			1.8	G1B	1/2	Grasp End On Bobbin
Drop Bobbin		RL1	9.3	M11Bm		Move End To Thread Clamp
			-	G2		Regrasp End
			47.5			
C. Retie End Not Visible						
Reach To Bobbin In Pocket		R6B	8.6			
Grasp Bobbin Near Center		G1A	2.0			
Pull Bobbin Off Skewer		D1E	4.0			
Move Bobbin Out of Pocket		M15B	15.2	R14B		Reach To Bobbin In L.H.
Turn Butt Towards Body		T90S	-	G2		Regrasp Ends Around Fingers
			3.6	P1D		Reach To End On Bobbin
Turn Bobbin To Assist In	2	T90S	3.5	G1B		Grasp End
Finding End And Stripping			7.2	M8Bm		Pull Off To Remove Weak End etc.
			4.3	mR8Bm		Reach Back To Pick Up End
			-	RL1		Toss End Off
Move Bobbin To Pocket		M3B	5.8	mM11Bm		End Up To Thread Clamp Opening
			7.2	mM8B		End Across Top Of Thread Clamp
Drop Bobbin In Pocket		RL1	-	G2		Regrasp End
Reach Toward Supply						
Trough Or Pocket		R6B	4.0	D1E		Break End Off In Clamp
			65.4			

MTM ELEMENT ANALYSIS

File Study # 1

Part Name B-C Spooler Part No.
Oper. Name Thread Up Retie Bobbins Oper. No.
Operator No. Analyst RBM Date December, 1955

DESCRIPTION - LEFT HAND	F	MOTION	TMU	MOTION	F	DESCRIPTION - RIGHT HAND
D.Retie Bobbin Rejected Onto Sorting Table And Replaced In Supply Trough With Free End						
Reach To Bobbin In Trough		R4C	9.1			
Grasp Bobbin		G1A	2.0	R14B		Reach To Bobbin In Left Hand
Lift Bobbin Out Of Trough		M11F	12.8	G2		Regrasp Ends Around Fingers
			2.0	G1A		Grasp Loose End On Bobbin
Move Bobbin To Pocket		M3B	9.3	M11Bm		End Up To Thread Clamp Opening
			7.2	mY8B		End Across Top of Thread Clamp
Drop Bobbin In Pocket		RL1	-	G2		Regrasp End
Toward Supply Trough Or Pocket		R6B	4.0	D1E		Break End Off In Clamp
			45.7			

Thread Up Summary Element Description	Element Time TMU	Leveled Time Conversion Factor .0006	Occurrences Per Piece	Total Time Allowed
1. Thread Up Full Bobbin-No Tail Interference				
A.Secure Bobbin For Threading	23.2	.01392	.9675	.01347
B.Thread End In Clamp	46.3	.02778	1.00	.02778
Total	69.5	.04170		.04125
2. Thread Up Full Bobbin-Tail Interference				
A. Secure Bobbin For Threading	23.2	.01392		
B. Thread End In Clamp	61.4	.03684		
Total	84.6	.05076	.02	.00102
			Total Thread Up	.04227
3. Thread Up Retie Bobbin				
A.Retie End Visibly Free-Leading to Snick Plate Etc.	53.6	.03216	.15	.00482
B.Short Retie End Visible	47.5	.02850	.40	.01140
C.Retie End Not Visible	65.4	.03924	.20	.00785
D.Retie Bobbin Rejected Onto Sorting Table And Replaced In Supply Trough	45.7	.02742	.25	.00686
			Total Retie	.03093

MTM ELEMENT ANALYSIS

File: Study # 1

Part Name: B-C Spooler — Part No.:
Oper. Name: Doff Cheese — Oper. No.:
Operator: — No.: — Analyst: RBM — Date: December, 1955

DESCRIPTION - LEFT HAND	F	MOTION	TMU	MOTION	F	DESCRIPTION - RIGHT HAND
1. Doff Full Cheese-Single						
A. Reach To Adjacent Cheese		R4B	8.6	R6B		Reach To Front of Chese To
Grasp Chese		G1A	2.0	G1A		Grasp Cheese Doff
Swing Up To Clear An Area To Doff Freely		M7B	7.5	D2E		Dislcdge From Arm
Release Cheese		RL1	2.0			
			20.1			
B. Place Doffed Cheese On Trident Truck And Get Starter						
			18.6	TBC1		Turn To Truck
			5.7	M6Bm		Chese To Spindle On Trident
Reach To Starter Core		R10B	11.5	mM3B		Cheese Down Onto Spindle
Grasp Starter		G14	2.0	RL1		Drop Cheese
Pull Up Off Spindle		M12B	13.4			
			51.2			
C. Put Starter On Spooler Spindle						
			18.6	TBC1		Turn To Spooler
Move Starter To Adjacent Cheese		M4B	6.9			
Place Against Cheese		G5	0			
Push Cheese Up To Center Starter On Empty Spindle		M4C	8.0			
Seat Starter On Spindle		M3A	4.9			
Release Starter		RL1	2.0			
Hand Away To Reach For Next Bobbin		R12E	11.8			
			52.2			
Total Single Doff			123.5			
5. Doff Full Cheese-Two Cheses						
A. Reach To Adjust Cheese		R4B	8.6	R6B		To Front Of 1st Cheese To Doff
Grasp Cheese		G1A	2.0	G1A		Grasp Cheese
Swing Up To Clear A Doffing Area		M7B	7.5	D2E		Dislodge From Arm
Release Cheese		RL1	2.0	M3B		Move To Transfer to L.H.
Reach To Cheese in R.H.		R28	4.0			
Transfer Doffed Cheese To L. H.		G3	5.6			
			10.1	R8B		To Front Of 2nd Cheese To Doff
			2.0	G1A		Grasp Cheese
			7.3	B2E		Dislodge From Arm
			49.3			

MTM ELEMENT ANALYSIS

File: Study # 1

Part Name: B-C Spooler — Part No.:
Oper. Name: Doff Cheeses — Oper. No.:
Operator: — No.: — Analyst: RBM — Date: December, 1955

DESCRIPTION - LEFT HAND	F	MOTION	TMU	MOTION	F	DESCRIPTION - RIGHT HAND
B. Place Doffed Chesses On Trident Truck & Get Two Starters						
			18.6	TBC1		Turn To Trident Truck
Move Cheese To Spindle		M6Bm	5.7	M6Bm		Move Cheese To Spindle
Move Cheese Down On Spindle		mM3B	3.6	mM3B		Move Cheese Down On Spindle
Release Cheese		RL1	2.0	RL1		Release Cheese
Reach To Starter		R10B	11.5	R10B		Reach To Starter
Grasp Starter		G1A	2.0	G1A		Grasp Starter
Pull Up Off Spindle		M12B	13.4	M12B		Pull Up Off Spindle
			56.8			
C. Put Starters Or Spooler Spindles			18.6	TBC1		Turn To Spooler
Move Starter To Adjacent Cheese		M4B	6.9	M4B		Move Starter Towards Spindle
Place Against Cheese		G5	-			
Push Cheese Up & Center Starter On Spindle		M5C	9.2			
Seat Starter on Spindle		M3A	4.9			
Release Starter		RL1	13.5	M10C		Move Starter to 2nd Spindle
			4.9	M3A		Seat On Spindle
			2.0	RL1		Release Starter
Reach Toward Next Bobbin		R12E	11.8	R12E		Hand Away To Reach Next Bobbin
			71.8			
Total Double Doff			177.9			

Doffing Summary

	Element Time TMU	Leveled Time Conversion Fac. .0006	Occurrences Per Piece	Total Time Allowed
4. Doff Single Full Cheese				
A. Doff Single Cheese	20.1	.01206		
B. Place On Trident & Get Starter	51.2	.03072		
C. Put Starter On Spooler Spindle	52.2	.03132		
Total Single Doff	123.5	.07410	1	.7410
5. Doff Two Full Cheeses				
A. Doff Two Cheeses	49.3	.02958		
B. Place On Tridents & Get 2 Starters	56.8	.03408		
C. Put Starters On Spooler Spindles	71.8	.04308		
Total Double Doff	177.9	.10674	Double	.10674

INDUSTRIAL ENGINEERING SEMINARS CORNELL UNIVERSITY

Cornell University will hold Industrial Engineering Seminars, June 12-15, 1956 at Ithaca, New York. The Seminars will be sponsored by the Department of Industrial and Engineering Administration, Sibley School of Mechanical Engineering.

Objectives--

The economic stress of increasing demand matched with strong competition makes the challenge of maintaining high production and reducing costs particularly pertinent to all levels of management. With these problems in mind Cornell University offers the third annual Industrial Engineering Seminars. These Seminars offer, in the congenial surroundings of a university campus, an opportunity for a critical study and reappraisal of some of the major problems in areas of interest to industrial management.

There will be ten seminar workshop sessions led by qualified discussion leaders in each of six major areas. In addition during the four day period, seven outstanding industrial leaders will speak at sessions attended by all participants. The seminar group topics are:

A. Industrial Management

B. Manufacturing Engineering

C. Small Plant Management

D. Work Measurement

E. Applied Industrial Statistics

F. Industrial Marketing

For further information address inquiries to R. E. Garrah, Seminars Coordinator, Cornell University.

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FT. WAYNE CHAPTER-AIIE-HOLDS SECOND ANNUAL MANAGEMENT CHAPTER

A most successful one-day management conference was conducted by the Ft. Wayne Chapter-AIIE-at the Van Orman Hotel, April 26, 1956. Some 250 persons were in attendance to learn some fundamentals concerning cost reduction and better management.

Mr. Brooks McCormick, Vice-President in charge of manufacturing, International Harvester Company keynoted the conference with his presentation "Management and the Industrial Engineer."

MTM and predetermined time systems in general were an integral part of the program. Mr. D. W. Karger, The Magnavox Company discussed "The Background and Development of Predetermined Time Systems." Mr. F. H. Bayha, The Magnavox Company presented "Fundamental MTM Techniques." "MTM and Time Study Team in the Office," was the subject for H. L. Scheur, Eli Lilly and Company.

A panel discussion on "Applications of MTM" concluded the MTM portion of the program. Participants in the panel discussions were: R. E. Awbrey, The Magnavox Company; Serge A. Birn, Serge A. Birn Company; C. F. Townsley, General Electric Company; and Richard F. Stoll, MTM Association.

Linear programing, linear responsibility charting and automation were the subjects of additional presentations.

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CIMTMA
CENTRAL IOWA MTM ASSOCIATION

1955-1956 officers will be:

President - - - - -	George Ruby
Vice-President- - -	Durwin Hanson
Secretary - - - - -	Dwight Priaulx
Treasurer - - - - -	Dan Griffen
Directors - - - - -	Evan De Jong
	R. E. Gerhardt
	John Kreitinger

The February 14, 1956 meeting of CIMTMA heard E. F. Scoutten, The Maytag Company, talk on "Pattern Bargaining" and the need for cooperation of Industrial Relations Departments & Industrial Engineering Departments because of present day labor relations.

Professor Jack Mills, Iowa State College, spoke to the group March 13, 1956, on the activities and purposes of the American Institute of Industrial Engineering, AIIE.

E. F. Butler, Director of Public and Employee Relations, The Maytag Company, is the scheduled speaker for the April 10th meeting.

MTM ASSOCIATION OF OHIO

David L. Raphael, Research Associate, University of Michigan, addressed the March 26th meeting. Mr. Raphael discussed the use of research in connection with the everyday problems in the application of MTM.

A panel discussion on problems of MTM application is planned for the April 30 meeting.

MTM ASSOCIATION OF SOUTHERN CALIFORNIA

Lee Sidwell, Manager of Manufacturing Planning Department, Aeronautical Division, Robertshaw-Fulton Controls Company, addressed the April 11 meeting on the subject "An Evaluation of MTM in a Job Shop Situation."

Planning for short run production points up the need for a realistic tool for estimating direct labor requirements. Mr. Sidwell has been engaged in planning for such production in a plant where MTM is used to obtain the information.

ST. LOUIS CHAPTER MTM ASSOCIATION

"An Appreciation Course in MTM," was scheduled for March meeting. The course was conducted by the Industrial Engineering Department, Fred Medart Manufacturing Company. The meeting was presented by popular demand. The following engineers participated in the presentation:

James R. Brauer - - Moderator
Ralph Hoffman - - - Moves and Positions
Warren Kuhn - - - - Simo Motions
Louis Lister - - - - Body Motions
W. F. Robertson - - Reach and Grasp
Robert Boyer - - - - Release, Disengage, & Apply Pressure.

Newly elected Chapter Officers for 1956 are:

President - - James Brauer
Fred Medart Manufacturing Company

Vice-President-Walter A. Willis
Sangamo Electric Company

Secretary - - John Bedford
Greenleaf Manufacturing Company

Treasurer - - John A. Missimore
Loose Leaf Metals Company

TORONTO CHAPTER OF MTM ASSOCIATION

Officers - 1956-1957

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Vice-President-James Rae
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JANUARY 1, 1956

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RESEARCH REPORTS

R.R. 101 Disengage

This report contains a preliminary study of the element disengage. While it is still classified as tentative, the report contains some extremely interesting conclusions on the nature and theory of this element.

R.R. 102 Reading Operations

The first step in the use of MTM for establishing reading time standards is contained in this report. In addition, the report contains a synopsis of the work done in this field by 11 leading authorities.

R.R. 104 MTM Analysis of Performance Rating Systems

A talk presented at the SAM-ASME Time and Motion Study Conference, April 1952. It contains an analysis of performance rating systems and various performance Rating Films from an MTM standpoint.

R.R. 105 Simultaneous Motions

This report represents almost two man-years' work on a study of Simultaneous Motions. It is a final report of the Simultaneous Motions project undertaken by the MTM Association. While it does not purport to provide complete and exhaustive answers to all problems in the field of Simultaneous Motions, it presents a great deal of new and valuable information which should be of interest to every MTM practitioner.

R.R. 106 Short Reaches and Moves

This report contains an analysis of the characteristics of Reaches and Moves at very short distances. It develops important conclusions concerning the application of MTM to operations involving these short distance elements.

R.R. 107 A Research Methods Manual

The research activity of the Association has developed an effective and comprehensive set of methods for carrying on research in human motions. This report details the major techniques used. Adequate sources of motion data, film analysis, data recording, and statistical methods of analysis are among the topics discussed.

R.R. 108 A Study of Arm Movements Involving Weight

In this report, the results of a large investigation into the effect of weight on the performance times of arm movements are presented. While more effective means of determining correct time allowances for moving weights are given, the comprehensive discussion of the whole area of weight phenomena is probably of more fundamental importance. The effect of such conditions of performance as the use of one or two hands, sliding vs. spatial movements, and male and female performance are among the topics presented.

RESERVE
THESE DATES
IN '56

1956			OCTOBER			1956
SUN	MON	TUE	WED	THU	FRI	SAT
	1	2				6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

FIFTH ANNUAL INTERNATIONAL MTM CONFERENCE

Hotel Statler, New York City

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